Module 17
Gross & Net Capacity

Learning Objectives

By the end of this section, you will:

1. Know the difference between net capacity and gross capacity.
2. Know the difference between net load and gross load.
3. Know reserve capacity.
4. Understand the crane safety factor.
5. Know what conditions determine whether the jib effective weight is greater than its actual weight.

Crane capacity limitations must be determined prior to making a lift.

Gross Capacity
- Deductions
Net Capacity

The capacity of a crane is identified by two terms:

- Gross Capacity = the maximum weight a crane can lift at a defined radius. This is the number on manufacturers load charts.
- Net Capacity = the load weight that the crane can safely lift. It is gross capacity minus all the deductions.

Gross Capacity

This is the weight that is depicted in the load chart.

Deductions From Gross Capacity

Load handling devices on cranes result in deductions from gross capacity. These devices may include the load block, the headache ball and all rigging, jib, etc., below the hook. Always refer to manufacturer notes to determine deductions.

Load Handling Devices

Load Block	Headache Ball	Rigging	Parts of Line

The auxiliary lifting device configuration affects the crane's capacity.

Hydraulic Crane

- Auxiliary boom head
- Manual section
- Position of fixed boom extension
- Position of telescoping boom extension

Lattice Boom Crane

- Auxiliary boom head
- Jib/extension

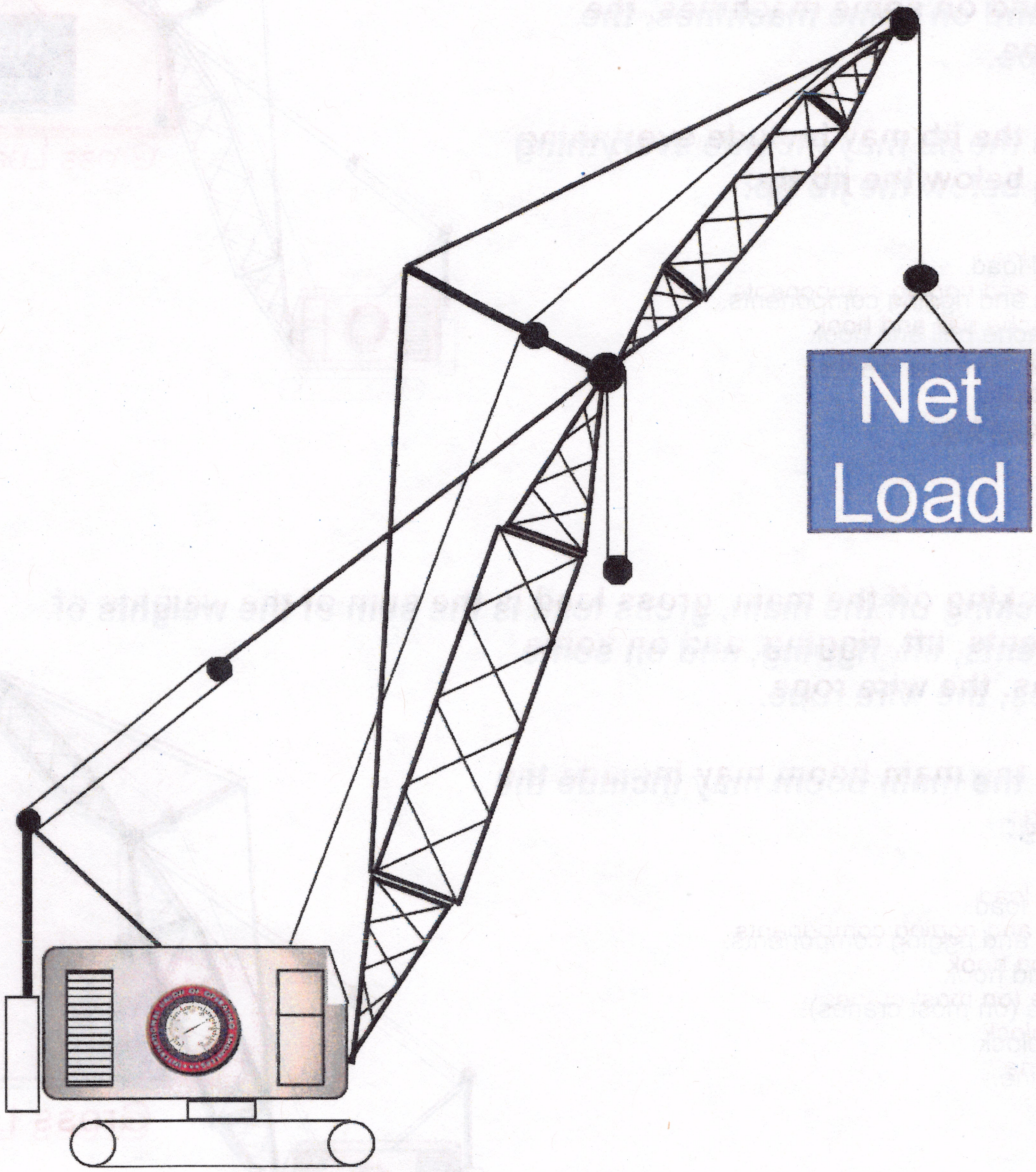
On hydraulic cranes, the operator must determine if the auxiliary head is erected and if the manual section is retracted or extended. Operators must also determine what the position of a fixed lattice boom extension is-stowed, stored, erected or offset, and what the position of a telescoping lattice boom extension is-stowed, stored, erected and retracted, erected and extended, or offset.

The auxiliary lifting device configuration affects the crane's capacity. On lattice boom cranes, the operator must determine if the auxiliary boom head is erected and being used and if the jib is erected and being used.

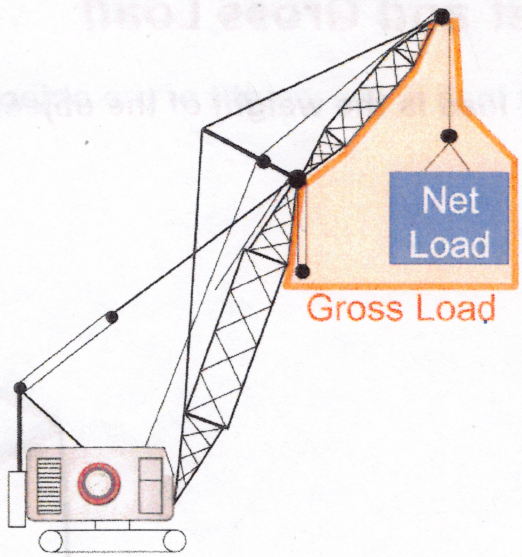
Net capacity is the weight that a crane can lift after capacity deductions have been subtracted from the gross capacity.

Net and Gross Load

Net load is the weight of the object being lifted.



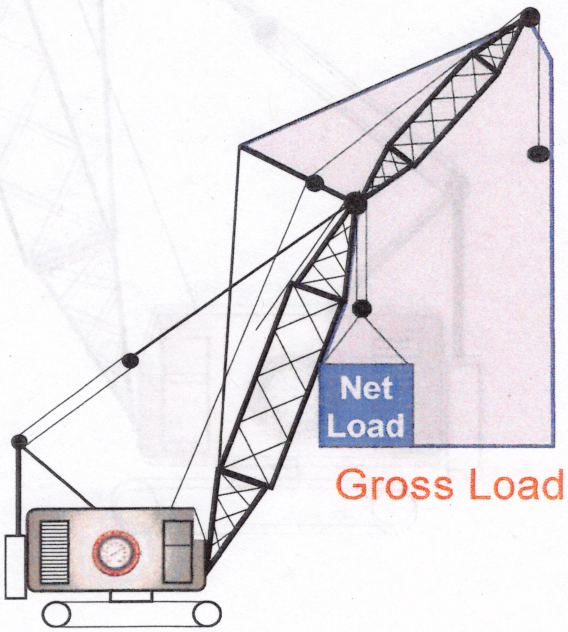
When picking off jib or extension, gross load is the sum of the weights of attachments (if erected but not used to lift the load), lift, rigging, hooks and blocks and on some machines, the hoist rope.



Load on the jib may include everything hanging below the jib tip:

- Actual load.
- Slings and rigging components.
- Headache ball and hook.
- Jib line (on most cranes).
- Load block.
- Main load line.

When picking off the main, gross load is the sum of the weights of attachments, lift, rigging, and on some machines, the wire rope.



Load on the main boom may include the following:

- Actual load.
- Slings and rigging components.
- Ball and hook.
- Jib line (on most cranes).
- Load block.
- Load line.
- Jib.

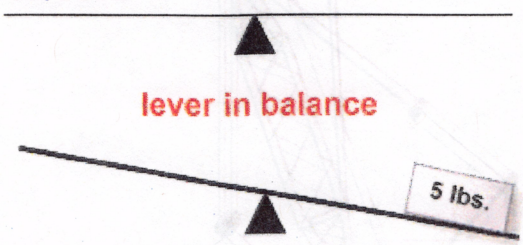
Cranes operate on a safety factor to avoid tipping or component failure.

Maximum rated capacity is a percentage of the load that would tip the crane or causes structural failure. The maximum rated capacity for crawler cranes is 75%, for mobile cranes on outriggers it's 85%, for mobile cranes on tires it's 75%, and for commercial boom cranes on stabilizers it's 85%. Different equipment manufacturers may use other percentages.

Effective Weight

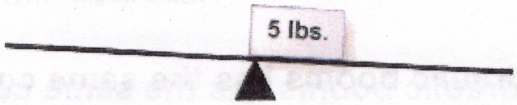
The force an attachment exerts on a crane is usually different than its actual weight.

Effective Weight is the effect a weight has on a lever proportionate to its placement on the lever.



lever in balance

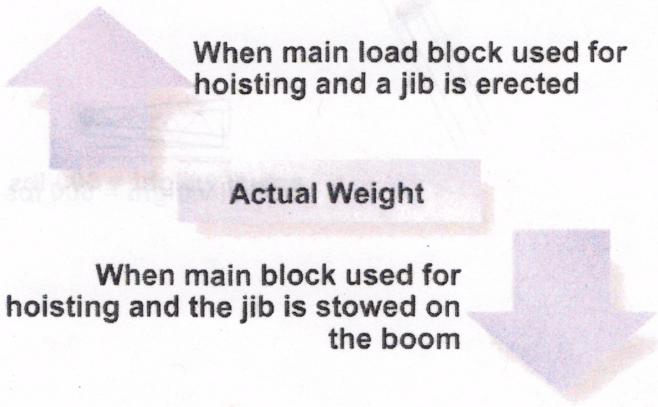
weight at end of a lever forces the lever down



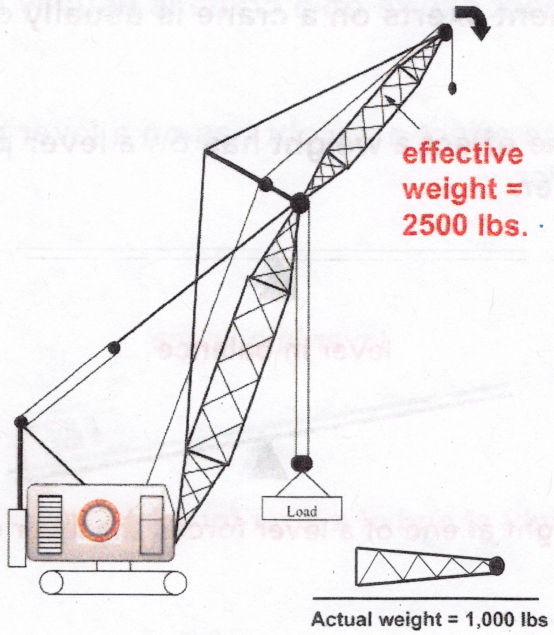
Same weight placed close to the fulcrum causes a different effect

Effective weight may be greater or lesser than actual weight.

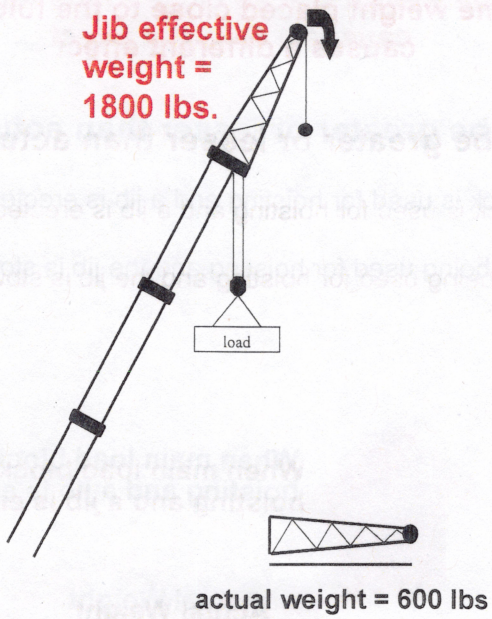
- When the main load block is used for hoisting and a jib is erected, effective weight may be greater than actual weight.
- When the main block is being used for hoisting and the jib is stowed on the boom, effective weight may be less than actual.



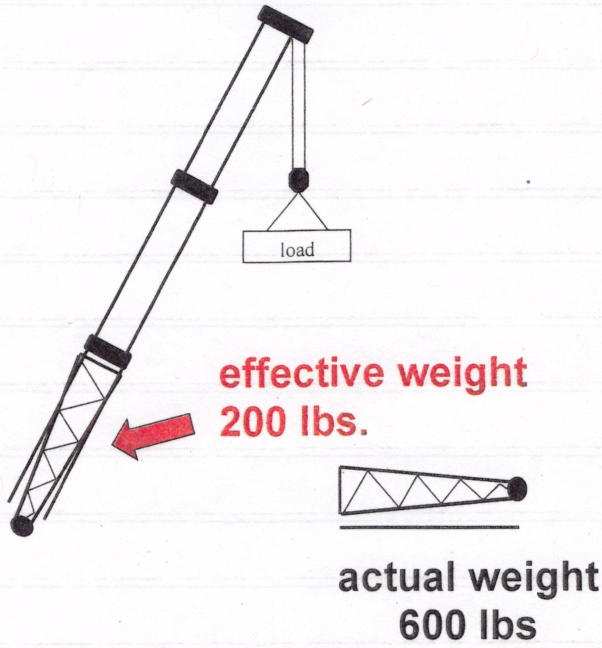
When making a lift from the main boom with a jib erected, the effective weight of the jib is more than its actual weight.



Effective weight on hydraulic booms has the same consideration.



When a lift is made from the main boom with an extension pinned to the base section of the boom, the effective weight is less than the actual weight of the extension.



What should you consider when determining applicable deductions for capacity once the gross capacity has been established?

» Rigging.

» Load block(s).

» Headache ball.

» Auxiliary boom head.

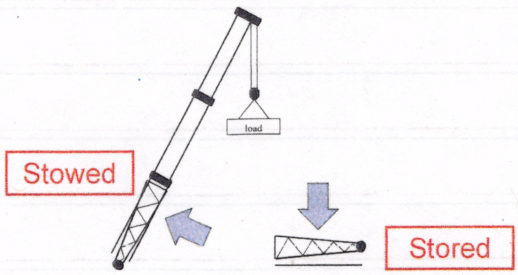
» Boom extension and/or jib not in use.

» Load line.

Which number should you look for when checking load charts? Check one.

☑ GROSS CAPACITY ☐ NET CAPACITY

Which of the jibs is stored and which is stowed?



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